

US-PAT-NO: 6704317

DOCUMENT-IDENTIFIER: US 6704317 B1

TITLE: Multi-carrier LAN modem server

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Application Filing Date - AD (1):

19980527

Brief Summary Text - BSTX (12):

Interconnected LAN networks or individual users located in multiple physical locations are known as Wide Area Networks (WAN). The interconnections are performed via services such as dedicated leased phone lines, digital subscriber lines, dial-up phone lines, satellite links, and data packet carrier services. Wide area networking can be as simple as providing modems and a remote access server to allow remote users to dial in; or it can be as complex as linking hundreds of branch offices across the world using special routing protocols. Once type of WAN interconnection mechanism is Asymmetric Digital Subscriber Line.

Detailed Description Text - DETX (6):

The forwarder 60 is a multi-point forwarder that runs a single-PPP-session module 224 to provide the necessary routing functionality for multi-point connectivity between devices 70 in the DMT LAN 20 and the external WAN environment 90.

Detailed Description Text - DETX (7):

The multi-point forwarder 60 includes a name address translation protocol module 212 that allows a single PPP session (i.e., a single Internet IP address) to serve multiple DMT LAN devices 70, each having separate IP addresses on the local DMT LAN 20.

Detailed Description Text - DETX (8):

FIG. 2 shows the protocol layers and the multi-point forwarder 60 that supports multiple IP sessions on behalf of the DMT LAN devices 70 with just one PPP session terminated in module 224 of the forwarder 60. Any client device 70 may initiate the session, and it remains active until terminated. Termination may either be manual or automatic (timed). The PPP session module supports external network access for the local DMT LAN devices 70. A Network Address Translation (NAT) module 212 runs NAT services in an upper layer of the multi-point forwarder 60 thereby allowing a port number to be associated with the client's local IP address. NAT module 212 makes devices on the DMT LAN 20 appear as a single IP address, thus allowing the devices to communicate with

external networks 90, including, for example, the Internet. Internally, the DMT LAN 20 uses private addressing. When a device 70, which is known locally by its private address, desires to communicate with a device on network 90, it sends the request to gateway 100. Before gateway 100 transmits the request to the network 90, forwarder 60 translates the private address to a common IP address assigned to gateway 100. Further details of NAT are disclosed in U.S. patent application Ser. No. 9/035,600, filed Mar. 5, 1998, entitled Method and Protocol for Distributed Network Address Translation, the contents of which are hereby incorporated herein by reference. All remote access is therefore handled via the multi-point forwarder's 60 PPP module 224.

Detailed Description Text - DETX (9):

The multi-point forwarder 60 includes a routing module 210 utilizing dynamic host configuration protocol (DHCP) and management module 220 (MNGT), which implements management functionality via, e.g., an SNMP agent, and a PPP module 224 for PPP session management. A PPP session can be initiated by any local device's 70 request for remote access (e.g., a Web browser). The multi-point forwarder 60 also provides session authentication and security 216 (AUTH). The routing module 210 enables local IP addresses to be assigned to any local client device 70. Network address translator 212 allows the single PPP session to provide remote connectivity to any number of client devices 70 simultaneously.

Detailed Description Text - DETX (16):

As shown in FIG. 3, the adapter device may be either an internal adapter device 74 or an external adapter device 76. Internal devices 74 are preferred primarily due to speed advantages of its interface, e.g., a standard parallel bus and. external adapter devices 76 are used primarily to provide backward compatibility. They differ mainly in that the external adapter 76 requires additional hardware (a port, or interface) and software layers (port driver 270) for communication between the adapter 76 and the client device 70 over a data bus. The internal bus may be a PCI, ISA EISA, or equivalent bus, while the external bus may be e.g., RS-232, parallel port, or USB port as shown in FIG. 3. These buses are known in the art and have been widely used by general-purpose computers. The external device adapter also provides the MAC 260 and physical layer 262 in an ASIC.

Detailed Description Text - DETX (32):

The adapter devices 74, 76 include a transceiver 400 that implements the physical layer 262, for communicating with other adapter devices 74, 76 and/or the multi-point transceiver 400 of the gateway device 100. As shown in FIG. 4, transceiver 400 of the preferred embodiment includes a transmitter portion 402 and a receiver portion 420. Transceiver 400 uses wide-band multi-carrier modulation, preferably in the range of 4-6 MHz. When the gateway 100 provides isolation from communications with access infrastructure (or if there are otherwise no conflicting services), the transceiver is easily scalable to operate down to approximately 100 KHz, and up to 8 MHz. It is to be understood that the frequency ranges actually used may extend beyond the presently preferred ranges given above. The adapter devices 74, 76 include an adapter interface, or port, for connection to a LAN device 70.

Detailed Description Paragraph Table - DETL (1):

SIMPLIFIED FORWARDER MULTI-POINT FORWARDER One PPP session per connection,
One PPP session for entire DMT managed in PC LAN network managed in the
Requires one IP session per session, gateway per FRD device Multiple local IP
addresses Only one PPP session at a given time supported by single gateway
Any computer on the DMT LAN can PPP session start a PPP session, but only one
at a Multiple simultaneous IP time sessions possible Full local DMT LAN
support (file and Any number of computers can printer sharing) start an IP
session at any time Minimal protocol processing in the RU Full local DMT LAN
support (file and printer sharing) Gateway becomes a router with NAT

Claims Text - CLTX (12):

12. The gateway modem server of claim 1, wherein said multi-point transceiver further comprises a point-to-point protocol module that provides routing functionality for multi-point connectivity between the plurality of devices on the local area network and the public network.

Claims Text - CLTX (20):

20. The gateway modem server of claim 1, wherein said multi-point transceiver further comprises at least one of a routing module and a session authentication and security module.